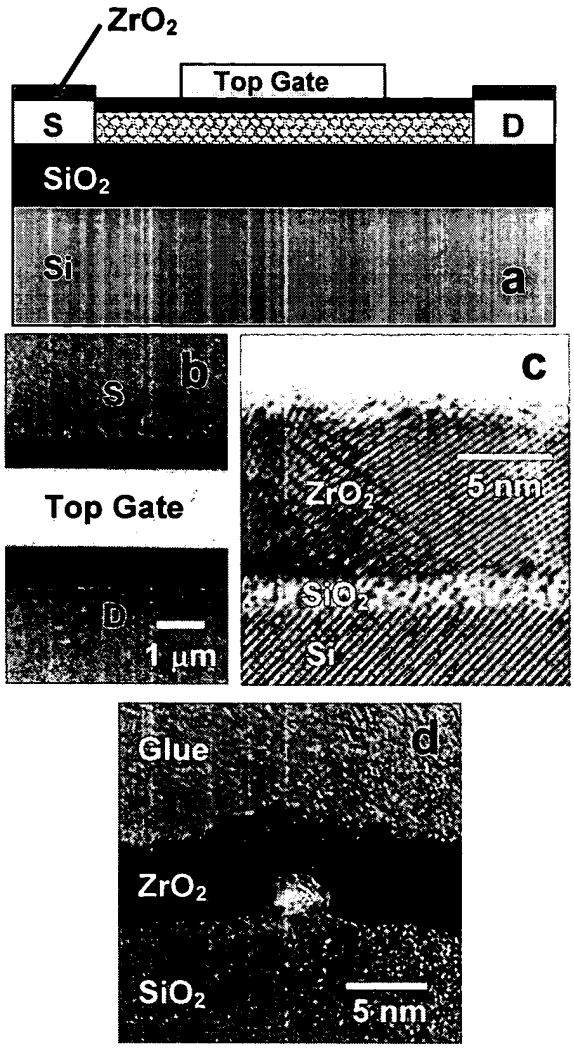
ZrO2
Top Gate
S
D
SiO2
Si
a
S
b
Top Gate
D
1 μm
c
ZrO2
5 nm
SiO2
Si
Glue
d
ZrO2
SiO2
5 nm

Figure 1

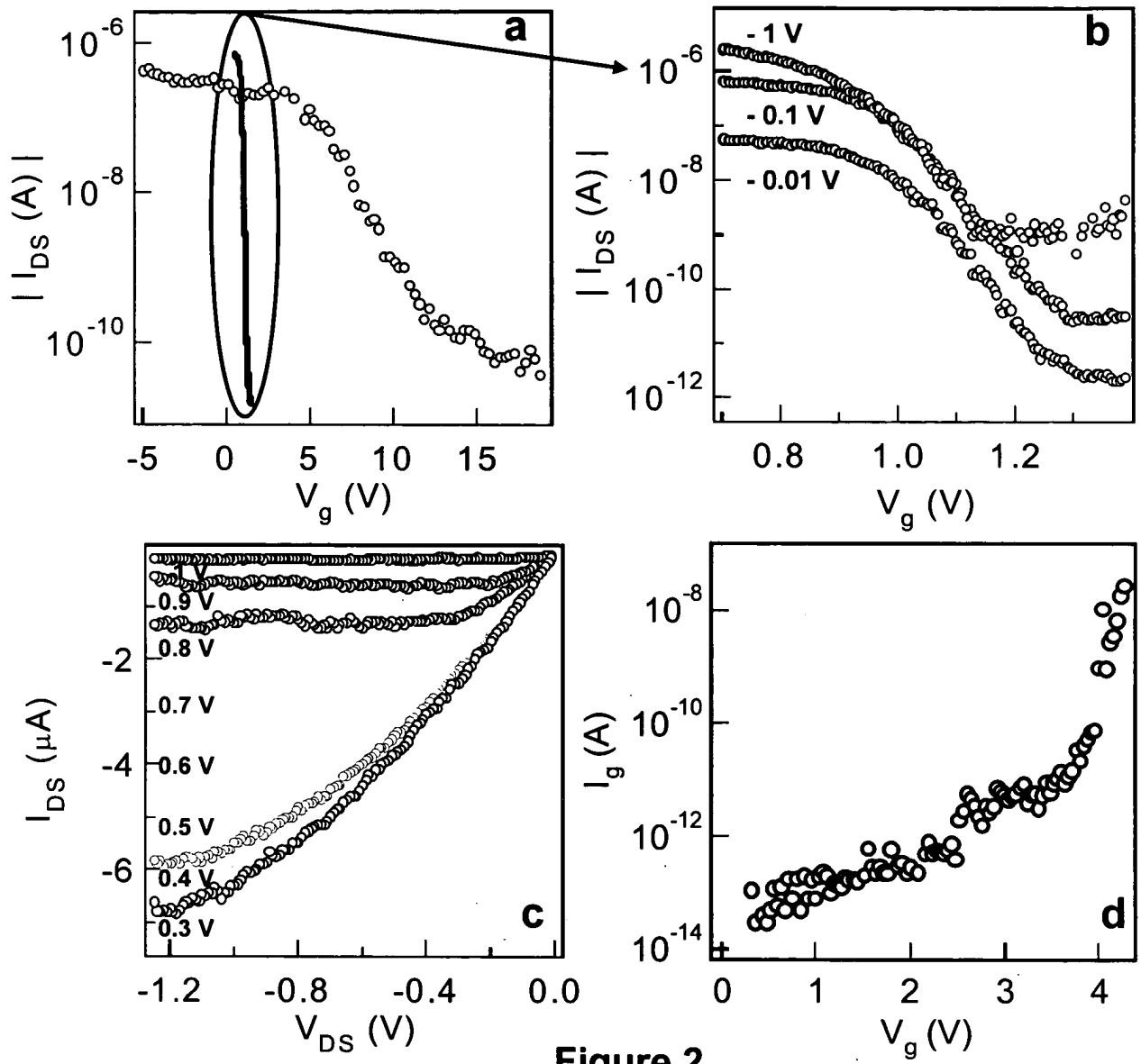
a
b
c
d
$10^{-6}$
$10^{-8}$
$10^{-10}$
$10^{-12}$
$10^{-14}$
$|I_{DS}(A)|$
$V_g$ (V)
-5 0 5 10 15
0.8 1.0 1.2
- 1 V
- 0.1 V
- 0.01 V
1 V
0.9 V
0.8 V
0.7 V
0.6 V
0.5 V
0.4 V
0.3 V
$I_{DS}$ (μA)
$V_{DS}$ (V)
-1.2 -0.8 -0.4 0.0
-2
-4
-6
$I_g$ (A)
0 1 2 3 4

**Figure 2**

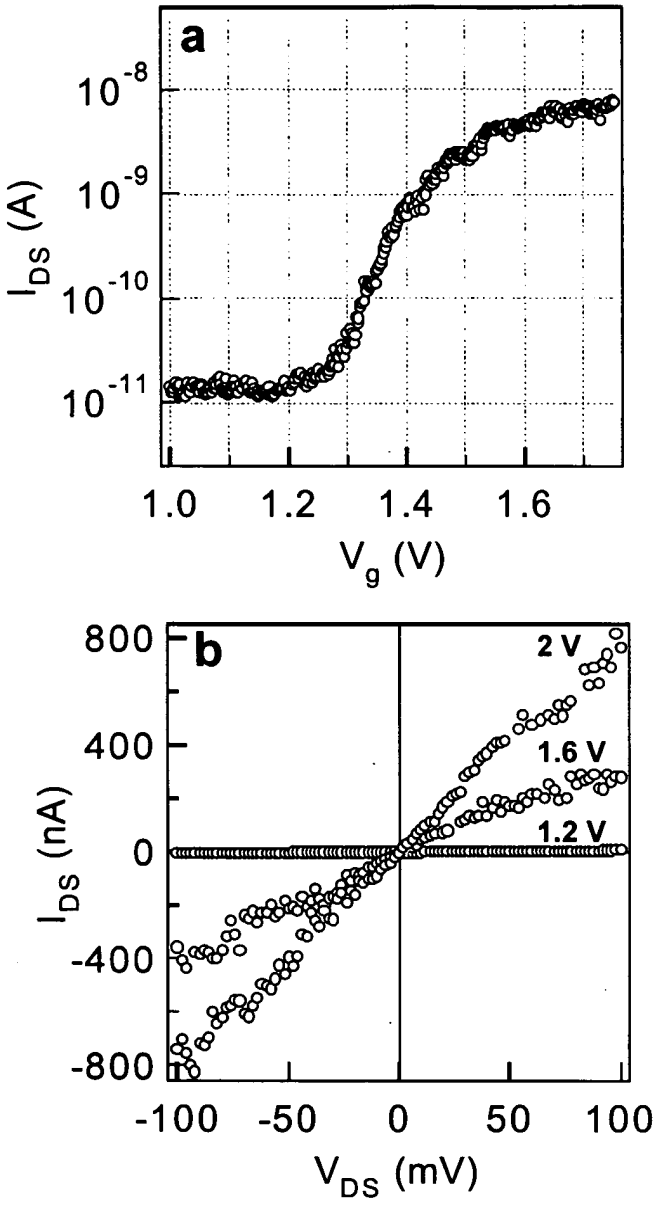
a
$10^{-8}$
$10^{-9}$
$10^{-10}$
$10^{-11}$
$I_{DS}$ (A)
1.0
1.2
1.4
1.6
$V_g$ (V)
b
800
400
0
-400
-800
$I_{DS}$ (nA)
2 V
1.6 V
1.2 V
-100
-50
0
50
100
$V_{DS}$ (mV)

**Figure 3**

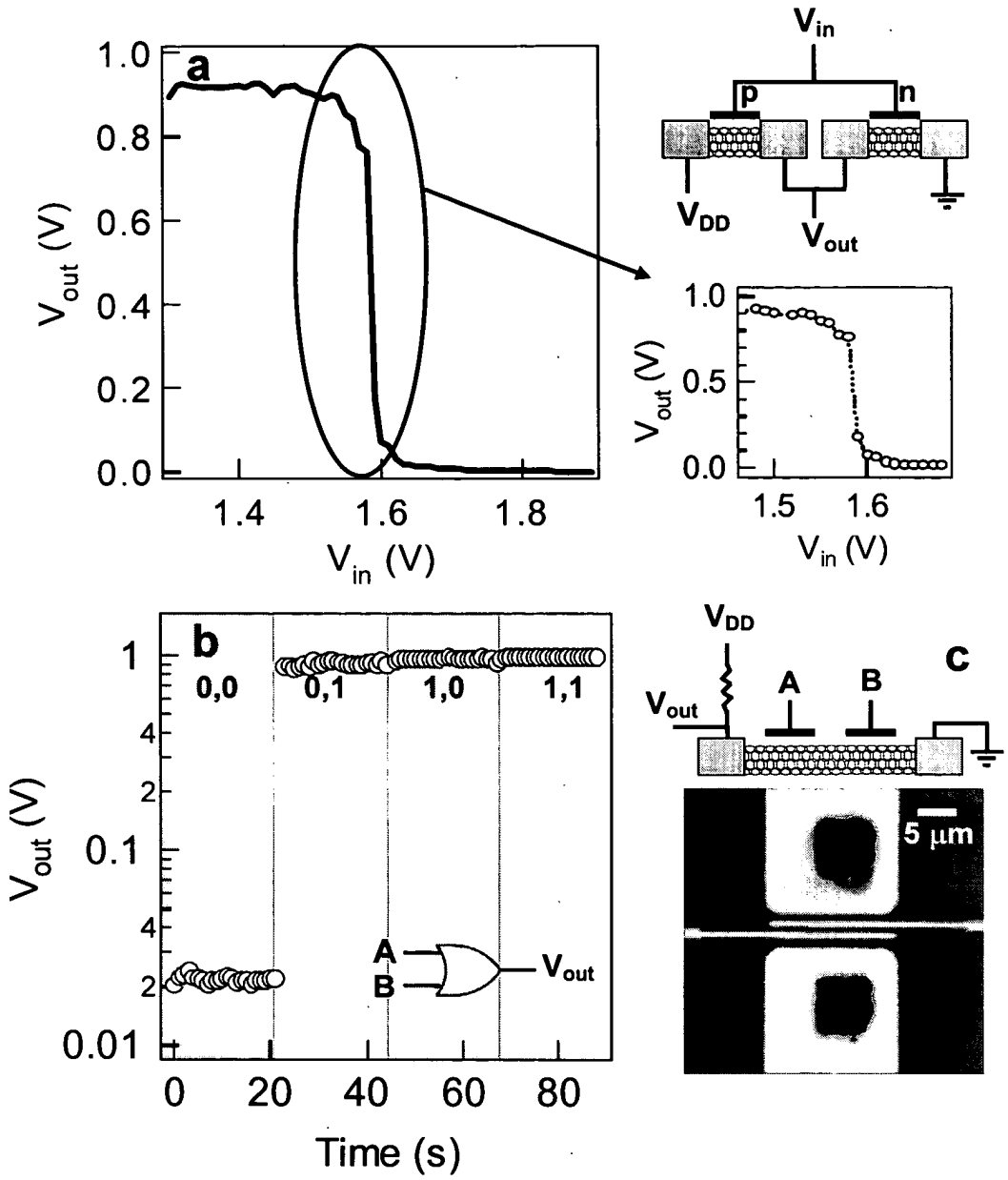
a
1.0
0.8
0.6
0.4
0.2
0.0
$V_{out}$ (V)
1.4
1.6
1.8
$V_{in}$ (V)
$V_{in}$
p
n
$V_{DD}$
$V_{out}$
1.0
0.5
0.0
$V_{out}$ (V)
1.5
1.6
$V_{in}$ (V)
b
1
4
2
0.1
4
2
0.01
$V_{out}$ (V)
0,0
0,1
1,0
1,1
A
B
$V_{out}$
0
20
40
60
80
Time (s)
$V_{DD}$
$V_{out}$
A
B
C
5 μm

**Figure 4**